REMARKS/ARGUMENTS

Claims 51-62 are pending in the application. Claims 51, 52, 53, 54 56, 57, and 59 have been amended. No new claims have been added and no claims have been cancelled.

The description has been amended to refer to the priority claim to Canadian Application No. 2,331,116, filed January 15, 2001 and Canadian PCT/CA01/01544 filed November 1, 2001 and U.S. Application No. 10/416,988 filed May 16, 2003. Applicant respectfully submits therefore that the application now complies with 37 C.F.R. 1.78A.

Claim Rejection – 35 U.S.C. § 101

Claims 51-62 are rejected under 35 U.S.C. § 101 on the basis that there is an absence of a physical transformation of matter or production of a concrete, tangible and useful result. Claims 51 and 62 have been amended to indicate that the measured spectrum is stored as said trace file and thus more clearly provides a concrete, useful and tangible result. Claims 52-61 comply with 35 U.S.C. § 101 at least due to their dependencies on claim 51.

Claims 51-62 were also rejected due to lack of utility due to the absence of a limitation as to the type of spectral analysis. Claims 51 and 62 have been amended to reference the type of spectral analysis as being that of nuclear magnetic resonance (NMR) spectrum analysis. Accordingly applicant respectfully submits that the utility requirement under 35 U.S.C. § 101 is better satisfied.

Claim Rejections Under 35 U.S.C. §112, 2nd Paragraph

Claim 51. The Examiner has rejected claims 51 and 62 due to the recitation "process for producing a trace file for use in spectrum analysis" while the claimed method steps did not clearly state the production of a trace file. Claims 51 and 62 have been amended to indicate the measured spectrum is stored as a trace file for use in spectral analysis. Applicant respectfully submits that claims 51 and 62 should now better comply with 35 U.S.C. § 112, 2nd paragraph.

Claim 51 and 62. The Examiner objected to claims 51 and 62 due to the recitation of "trace file" alleging there is no limiting definition for this term in the specification. However, paragraph 52 of the specification clearly states that "the trace file is comprised of

intensity and frequency values representing a measured spectrum having a flat baseline and well defined peaks that have positive well-defined areas". Other references to the trace file appear in paragraphs 55 and 67, for example. Accordingly, it is respectfully submitted that the rejection is improper.

Claim 52. Claim 52 has been amended to positively recite that the initial spectrum includes at least one peak associated with a contaminant to provide antecedent basis for the term "contaminant". Accordingly, the rejection as it pertains to claim 52 is overcome.

Claim 53. The Examiner has rejected claim 53 alleging that the recitation "wherein applying a notch filter comprises producing an adjusted set of notch filter parameters and applying a notch filter employing said adjusted set of notch filter parameters" is unclear in the way it limits the notch filter. Claim 53 has been amended to indicate that the notch filter parameters are used to control the notch filter to cause the filter to filter the selected region. Applicant respectfully submits that this overcomes the rejection.

Claim 54. The Examiner has rejected claim 54 alleging that the recitation "wherein applying a notch filter comprises iteratively adjusting said set of notch filter parameters and applying a notch filter" is unclear in the way that it further limits the notch filter. Claim 54 has been amended to clarify that the notch filter parameters are iteratively adjusted and the notch filter employing such parameters is iteratively applied to the selected region until a certain condition is reached. Accordingly, Applicant respectfully submits the rejection of claim 54 is overcome.

The Examiner also alleges that there is a lack of antecedent basis for "the absolute values of the areas defined by peaks above and below the baseline of said initial spectrum". Claim 54 has been amended to remove the definite article "the" in reference to the absolute values to remove any confusion. As for how the notch filter provides the desired result, applicant respectfully submits that one of ordinary skill in the art would readily appreciate from the language of the claim and the context of the claim, that the successive filtering provided by the iterative application of the filter and associated use of filter parameters will successively filter the selected region of the spectrum and filtering will stop when the recited condition is reached.

Accordingly, applicant respectfully submits the amendment to claim 54 overcomes the rejection as it pertains to claim 54.

Claim 60. The Examiner objects to claim 60 alleging the specification does not provide a limiting definition for this term. Paragraph 60 of the application describes "correcting the measured spectrum for drift effects effectively setting the two extremes of the baseline of the spectrum ... to have zero slope". Drift effects in this context would be abundantly clear to one of ordinary skill in the art. Accordingly, it is respectfully submitted that the rejection is improper.

Claims 53 and 54. The Examiner rejected claims 53 and 54 alleging that essential steps are missing, in particular "defining" filter parameters and "comparing" filter parameters to a baseline.

The amendments to claims 53 and 54 overcome this rejection as they more clearly relate producing a set of filter parameters to iteratively adjusting such set. Accordingly, applicant respectfully submits that the rejection is overcome.

Claim Rejections Under 35 U.S.C. §102

Claims 51,52, and 55-62 are rejected under 35 U.S.C. 102(b) as being anticipated by CCL.NET.

CCL.NET appears to be a readme file for a program known as MestRe-C, for use in NMR data processing. The reference alludes to manipulating the FID and refers to a plurality of things that can be done to the FID. Applicant's claims recite performing a Fourier Transform on the FID to produce an initial spectrum and then filtering a selected region of the initial spectrum to produce a filtered spectrum and then phasing the filtered spectrum. Note the succession of actions that are performed and the datasets on which the actions are performed according to applicant's claim.

CCL.NET describes certain available functions, but there is nothing to suggest an order of performing the functions or performing a succession of functions as recited in applicant's claims. For example, the filtering described by CCL.NET is available for the FID data, but there is nothing to suggest filtering a selected region of an initial spectrum produced in response to the FID data should be performed, as recited in applicant's claims. Filtering an

initial spectrum is different from filtering the FID data and the succession of functions on successive results is neither disclosed nor suggested by the cited reference. Consequently applicant respectfully submits claims 51, 52 and 55-62 are not anticipated by CCL.NET. The rejection is therefore improper.

Claim Rejections Under 35 U.S.C. §103(a)

Unpatentable Over Cameron in View of Otvos

Claims 51-59 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cameron in view of Otvos (US 5,343,389).

Cameron relates to enhancing the utility of infrared data, not NMR data as recited in applicant's claims as amended. The Examiner alleges that Cameron clearly suggests the use of their advanced processing techniques on NMR data and relies on p. 233, first paragraph, but the reference to NMR spectroscopy at the indicated location suggests the use of a matched filter commonly used in NMR spectroscopy for optimization of signal to noise ratio, in an application involving an Infrared spectrum. Thus, the suggestion, if any, is in the opposite direction to that understood by the Examiner. That is, the suggestion is to apply NMR filtering techniques to IR data.

The Cameron reference provides a survey of data processing techniques but provides no specific method for the specific purpose of producing a trace file for use in NMR spectrum analysis. The table provided on p. 230 is said to show a partial list of operations routinely available on Fourier transform machines and the following text appears to attempt to describe at least some of these operations.

On the pertinent pages 230-232 and 238 relied on by the Examiner Cameron makes only passing references to things like smoothing, deconvolution and differentiation, without any specific application. In connection with smoothing, for example Cameron discloses taking a section of a spectrum, fourier transforming it, low pass filtering it and back transforming it. Cameron provides no suggestion as to performing any of the indicated operations on FID data associated with NMR spectroscopy, in a succession as recited in applicant's claims. Thus there

is nothing to suggest to one of ordinary skill in the art the specific operations or the order of such operations that should be performed on FID data to produce a trace file.

> Otvos indicates that:
>
> "reference sample FIDs are processed identically to give the frequency domain spectra used for the plasma lineshape fitting analysis. The processing operations of Fourier Transformation, phasing, and baseline correction are accomplished using the standard commercial software of the NMR spectrometer (Bruker "DISNMR" program). The FIDs are Fourier transformed using 16k data points after application of a 1.0 Hz linebroadening exponential multiplication function."

Otvos appears to believe that it is necessary to apply a 1.0 Hz linebroadening exponential multiplication function to the FID data before performing a Fourier transform. There is nothing to suggest that this function can be avoided. Applicant's claims recite a method that avoids this multiplication function and causes the Fourier transform to be performed directly on the FID data.

Essentially, Cameron indicates various things that can be done to spectral data and Otvos appears to indicate that before taking a Fourier transform the FID data must be subjected to a multiplication function. So even if the operations of Cameron were applied to the frequency domain data of Otvos, the result would be different than that claimed by the present applicants, because the applicant's claims recite performing a Fourier transform on the FID data and performing specific operations in a specific order which is disclosed by Cameron or Otvos. Consequently, applicants respectfully submit that neither reference taken alone or in combination provides sufficient basis for one of ordinary skill in the art to be motivated to employ or modify any of the operations of Cameron or to modify the teachings of Otvos in such a manner that the invention of the present applicants would be readily obtained without additional inventive input. Therefore applicants respectfully submit that the amended claims are not obvious and comply with 35 U.S.C. 103(a).

Unpatentable Over Dunkel in View of Oppenheim

Claims 51-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunkel (US 5,572,125) in view of Oppenhiem et al.

Dunkel describes no filtering step, but rather describes subtracting a baseline function from the spectrum. To do this the baseline function must first be calculated from baseline parameters. Dunkel suggests that the baseline can be modeled using a specific function, such as a polynomial function, which can be subsequently subtracted from the NMR spectrum.

Baseline correction typically corrects for artifacts that are pervasive in a spectrum – for example, a large baseline roll introduced by the presence of a lipoprotein, while retaining the remainder of the spectral signals of interest. The baseline correction algorithm would only be able to account for unwanted signals, such as the solvent suppression peak, to a certain extent that is constrained by the class of mathematical model utilized by the baseline correction algorithm.

Oppenheim appears to be an excerpt from a textbook on Digital Signal Processing that describes different types of digital filters.

The Examiner suggests it would have been obvious to practice the spectral processing techniques of Dunkel with the additional bandpass filters (i.e.) notch filters) taught by Oppenheim et al, where the motivation would have been to use improved FIR filters for removing noise from spectral data, resulting in the practice of the instant claimed invention.

Applicant respectfully submits that the purpose for including a filter is not to remove noise but to reduce or eliminate the effects of artifacts that appear in the spectrum due to certain materials. For example in the application contemplated by the applicants, NMR spectroscopy is applied to biological samples which contain various constituents one of which is water, which produces a dominant peak in the spectrum. The conventional wisdom for removing the effects of this type of dominant peak have involved the use of tuning techniques on the NMR instrument that acquires FID data. Such tuning techniques have involved changing the pulse sequence of the NMR instrument to pre-saturate the water in the sample, for example, by causing energy to be added to the water, causing it to have less effect in the spectrum ultimately

produced. Filtering in the claimed method, between the actions of performing a Fourier transform and phasing, allows artifacts such as produced by water to be removed or suppressed before phasing, which produces a better phasing result. Thus, while the tools existed for performing filtering as indicated by Oppenhiem, the conventional wisdom appears to have dealt with the problem of artifacts in an entirely different way apparently not contemplated by those skilled in the art. Consequently, applicants respectfully submit that no one appears to have appreciated the benefit a filter could provide in the combination of actions recited in applicants' claims and therefore it is not obvious to simply add a filter such as suggested by Oppenheim to the process described by Dunkel. Where is the motivation to add a filter when the conventional wisdom has been to tune the NMR instrument and if a filter were to be added, where is an optimum place to add it and what other steps are necessary to produce a trace file? The present applicants have answered all of these questions through their own inventive faculties without motivation sufficient to lead them clearly and without difficulty to the invention claimed.

The Examiner's rejection in view of Dunkel and Oppenheim extends to claims 52-54 which provide further specificity as to various embodiments of the filter. Further to the remarks above explaining why it would not be obvious to add a filter to the Dunkel teaching, neither Dunkel nor Oppenheim provide the basis for any motivation to employ a notch filter to suppress a peak associated with a contaminant as recited in claim 52, nor do these references provide the basis for any motivation to produce notch filter parameters and use such parameters to control the notch filter, nor do these references provide the basis for interactively adjusting the set of notch filter parameters or iteratively filtering until the specific result recited in claim 54 is achieved.

Therefore, for all of the above reasons, Applicant respectfully submits that the rejection under 35 U.S.C. § 103(a) is improper and should be withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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Attachments
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